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ABSTRACT

A review of research and proposed models on classroom processes allows identification of four key characteristics of effective classrooms in elementary and secondary education. The four characteristics encompass (1) teacher attention to student characteristics, including prior learning and learning styles; (2) congruence among the course goals, what the teacher teaches, and the knowledge and skills assessed by test instruments; (3) the amount of student engaged time; and (4) the degree of success a student experiences on educational tasks during the school day. Three models that synthesize research on effective classrooms and instructional methods illustrate different ways the four characteristics can be applied in classroom instruction. The models include Rosenshine's "direct instruction" model, Bloom's "mastery learning" model, and a model developed at Pittsburgh's Learning Research and Development Center emphasizing classroom opportunity, motivators, structure, and instructional events. Linking the four characteristics to other aspects of schools and classrooms, such as curriculum development or classroom management, suggests that these characteristics can be used to improve instruction, teacher supervision and support, and inservice training. (RW)

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CHARACTERISTICS OF EFFECTIVE CLASSROOMS

by

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CHARACTERISTICS OF EFFECTIVE CLASSROOMS

Persons concerned about improving schools must eventually address the question: What makes an effective classroom? An overwhelming amount of research addresses aspects of this question, for example, research into:

- What a teacher brings to the classroom (age, sex, education, years of experience, expectations, etc.)
- What a student brings to the classroom (family background, SES, general intelligence, preferred learning styles, specific knowledge and skills, etc.)
- How a teacher behaves in the classroom (instructional method, management practices, questioning behavior, amount of praise and feedback given, allocation of time, etc.)
- How a student behaves in the classroom (time-on-task, mastery of assigned work, rate at which student learns new content, etc.)
- How teachers and students interact in the classroom (ratio of teacher talk to student talk, total dyadic interaction, etc.)

It seems to us as if there have been three important trends in research related to classrooms over the past decade. First, the federal government has significantly increased funding for classroom-related research and has supported a number of large-scale, long-term studies (e.g., the Follow Through Studies of Stallings and Kaskowitz, and Soar and Soar; the Texas Teacher Effectiveness Study; the Instructional Dimensions Study; and the Beginning Teacher Evaluation Study). Second, the emphasis of this research has significantly shifted from the study of "inputs" to the classroom (e.g., teacher experience, student SES, instructional resources) to the study of "classroom processes" (e.g., teacher and student behaviors, student cognitive processing, norms and values in the classroom, etc.). Third, as a result of the federal government's funding priorities, the

majority of these studies on inputs and processes have been related to basic skills achievement of low socio-economic level students. Generally, achievement has been measured by norm-referenced tests.

As a result of these trends, a data base for improving classroom instruction is becoming available. There is also a growing consensus on some of the characteristics of an effective classroom--particularly, in basic skills for low SES, elementary school-age children (e.g., Bloom, 1976; Medley, 1977; Rosenshine, 1979; and Fisher, Filby, Marliave, Cohen, Dishaw, Moore, and Berliner, 1978).

This paper highlights four of these characteristics: specifically effective classrooms are those in which:

- teachers design and implement instruction in relation to specific student characteristics such as prior learning and learning styles
- teachers teach the knowledge and skills measured by the achievement tests used to assess student progress
- students are engaged in learning activities for an appropriate amount of time per school day
- students experience a moderate to high level of success in their learning activities.*

The paper then reviews several models of instruction which incorporate these characteristics in a more comprehensive framework (Cooley, Leinhart, and Lohnes' model of classroom processes, Rosenshine's direct instruction model and Bloom's mastery learning model). The paper concludes with a

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*The last three of these characteristics have been defined as a single construct, Academic Learning Time, by the Beginning Teachers Evaluation Study. (Fisher et al., 1978; Fisher, Marliave, and Filby, 1979). Academic Learning Time is defined as the amount of time a student spends on criterion-relevant content which he or she can perform with relatively few errors.

discussion on how inservice or supervisory programs for schools might be structured around such research findings.

Teacher Attention to Student Characteristics

Students differ in a great many ways. For the teacher, two clusters of student characteristics have particular import: the knowledge, skills, and attitudes a student brings to the classroom, and the way a student learns. This section describes some of the research on student characteristics and achievement.

Prior Learning

Most of the content taught in schools assumes some developmental sequence of learning tasks. Generally, it is assumed that a student needs to learn first grade content before attempting second grade content, that the student should pass Algebra I before beginning Algebra II, and so on. It is often easiest for teachers to assume that all students entering the learning situation have the necessary prerequisites; however, evidence abounds in student test results, grades, and cumulative records that each student entering a classroom brings a unique array of knowledge and skills.

Bloom's (1976) review of research indicated that as much as 80 percent of the variance in post-test scores may be accounted for by pre-test scores alone. Bracht and Hopkins (1972) found that about two-thirds of the variance in eleventh grade achievement was predictable from third grade achievement. These data indicate that the knowledge the student brings to the learning situation has a strong effect on how well the student

scores on the year-end assessment. Unless low-scoring students are provided instruction which is responsive to what they currently know and can do, their pattern of achievement is unlikely to change.

A number of Bloom's students (Anderson, 1973; Arlin, 1973; Block, 1970; Levin, 1975; and Özecelik, 1974) have shown that by attending to deficiencies in students' prior learning the correlation between entering and ending achievement could be significantly reduced. Most of these studies involved comparing scores from one group of students who received corrective procedures after each learning task with scores from a group of students who did not. The correlation between entering and ending achievement for the first group was .36 while it was .68 for the latter group.

Bloom and his students' work suggests that some method of identifying and attending to students' knowledge of prerequisite skills is a vital aspect of classroom instruction. Bloom (1976) summarizes his position thusly:

> If the school can assure each learner of a history of adequate cognitive entry in the first two or three years of elementary school period, the student's subsequent history of learning in the school is likely to be more positive with respect to both cognitive and affective learning outcomes. Similarly, for each new set of learning experiences which start at later stages of the school program (e.g., science, social studies, mathematics, second language), providing for adequate achievement and appropriate cognitive entry behavior in the initial and early stages of the new set of learning experiences is likely to have a strong positive effect on the learning of the later sets of tasks in the series. (p. 70)

Learning Style

Another student characteristic of import to teachers is how students

learn. Several different perspectives for looking at students' "learning styles" have been proposed. Fisher and Fisher (1979) define style as "a pervasive quality in the behavior of an individual, a quality that persists though the content may change" (p. 245). These authors provide a conceptualization of ten learning styles based upon whether students proceed from part to whole or whole to part, the number and type of senses used in gathering and processing information, and the emotional involvement and structure preferred by the learner. They also hypothesize two special styles -- the damaged learner and the eclectic learner.*

Letteri (1980) provides evidence for an expanded version of the cognitive aspect of learning style. He reports research using a cognitive profile composed of seven dimensions such as analytical-global, cognitive complexity-simplicity, and reflectiveness-impulsivity. These cognitive profiles separated seventh and eighth grade students into groups of high, medium, and low achievement. They also accounted for as much as 87 percent of the variance in standardized test scores.

Dunn and Dunn (1979) have developed an alternative conceptualization of learning style. They identified 18 elements of learning style which they divided into four groups: environmental, emotional, sociological and physical (see Figure 1).

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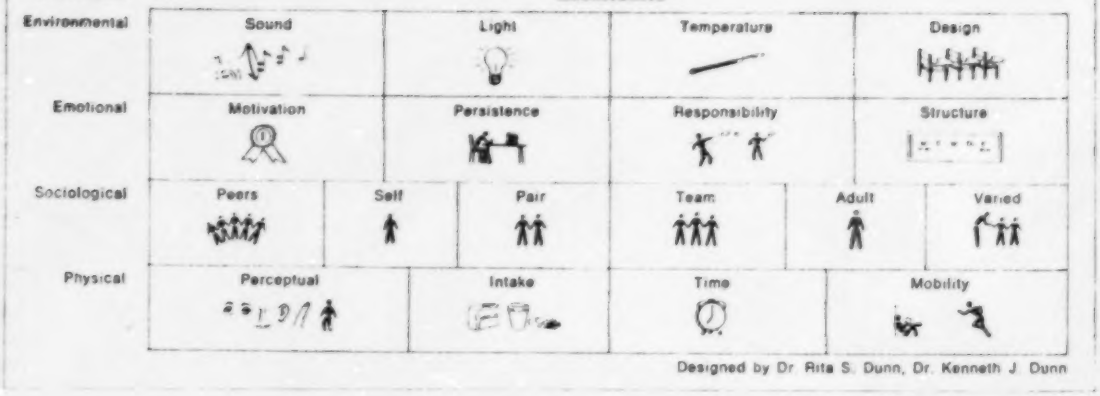
*Fisher and Fisher define a damaged learner as one who is physically normal yet not performing well because of deficiencies in other characteristics such as self-concept, social competency or aptitude. They define an eclectic learner as a student who can shift from one learning style to another depending upon the situation. While these students may prefer one learning style over others, they are not bound to it.

Figure 1. Diagnosing Learning Style



The environmental elements relate to stimuli in a person's surroundings that are pertinent to his or her learning. For example, some students require absolute silence when studying, while others actually require sound. Still others are simply able to "block out" any extraneous noise.

The emotional elements concern such factors as whether a student is motivated to learn, whether a student will persist in a task and assume responsibility for its completion, and the amount of structure a student needs. Most teachers would probably agree that students who are highly motivated, persistent, responsible, and require little structure need to be taught differently than those who are not.

The sociological elements relate to how students respond to people while learning. Many students probably can learn in a variety of sociological patterns, while others are more limited. Some work best alone, others with peers, still others with adults.

The physical elements deal with senses students use to process information as well as with the need to eat, drink or move about when studying.

Also important is the time of day when an individual's energy is at a peak; some people work best in the early morning, others in the dead of night.

With respect to students' preferred mode of perception, Dunn and Dunn (1979) report that recent research reveals that 20 to 30 percent of school-age youngsters appear to learn best what they hear. Another 40 percent remember best what they see, while the remaining 30 to 40 percent are either tactual/kinesthetic, visual/tactual, or some combination of these four major senses. The authors suggest the need for teachers to address this aspect of learning style since at present approximately 90 percent of all instruction is conducted by either lecture or lecture-discussion.

Though research on learning styles is just beginning to yield results, this work suggests teachers should attend to students' learning styles when they plan and deliver instruction.

Teacher Attention to Content Goals and to Knowledge and Skills Assessed

One of the most important characteristics of classrooms for persons attempting to improve instruction is the relationship between different facets of curriculum content: the content goals or objectives that are desired, the content actually taught by the classroom teacher, and the content tested by an assessment instrument.

The need for teachers and supervisors to be alert to the congruence between the content taught and the content tested was indicated in the Instructional Dimensions Study (Brady, Clinton, Sweeney, Peterson and Poyner, 1977). This study of reading/language arts and mathematics

instruction involved over 100 first and 100 third grade teachers. It found that the percent overlap between content taught and content tested (on a norm-referenced achievement test) ranged from 4 to 95 percent -- that is, some teachers covered 95 percent of the content of the test, while other teachers covered only 4 percent. In classes that covered more of the test content, students made greater gains in achievement. These achievement gains were more highly linked to the difference in content covered than to any other classroom variables. A reanalysis of the data showed that, in general, students must be taught at least 60 percent of the content tested if they are to attain expected levels of achievement.

During the 60's and early 70's attempts were made to more clearly relate content taught to content tested by developing curriculum guides and curriculum materials. However, English in his work has challenged the assumption of many curriculum supervisors who believe that what is in a curriculum guide (content desired) is the content teachers teach. It is his perception that "the cycle of writing curriculum guides and buying or writing tests based on them may never influence the behavior of the teacher who constructs the real curriculum (English, 1980, p. 558)."

Amount of Student Engaged Time

The importance of time spent on learning activities is a major consideration in many theories or models of instructions (e.g., Carroll, 1963; Bloom, 1976; Wiley and Harnischfegar, 1974) and has, as a result become a major topic of investigation (e.g., Brady et al., Fisher et al.). This

question involves two factors: (a) the amount of time allocated for an academic task and (b) the degree to which students actually spend that time working on the task.

Data from four separate research studies indicate that, in general, elementary teachers allocate between 55 minutes to 106 minutes each day for reading and between 52 minutes and 37 minutes for math (see Table 1).

Table 1

Average Time Allocations in Minutes for Reading/ Language Arts and Mathematics

	Mann Study (1928)	Beginning Teacher Evaluation Study Phase II (McDonald & Elias, 1976)		Instructional Dimensions Study (Brady et al., 1977)		Weiss Study (1977)	
	Grade 3	Grade 2	Grade 5	Grade 1	Grade 3	K-3	4-6
Reading	70.4	63.6	54.9	105.8	84.5	95	66
Math	39.2	37.5	48.0	48.6	52.6	41	51

However, the ranges for time allocated by individual teachers to academic subjects show an even wider variation. For example, Dishaw (1977) reported that time allocated per day for second grade reading and language arts ranged from a low of 34 minutes to a high of 127 minutes and for second grade math from 30 minutes to 59 minutes, whereas time allocated for fifth grade reading/language arts ranged from 57 to 156 minutes and for fifth grade math from 23 to 76 minutes. These differences in allocated time suggest that some students may have more than two or three times the opportunity to learn specific academic content than do other students.

Even if an adequate amount of time has been allocated for student learning, students may not be actively working during that time. The Instructional Dimensions Study (Brady, et al., 1977) showed that the average engagement rate (or percent of time-on-task) was about 60 percent for both reading and math. However, ranges among classrooms are even larger for engagement rate than for allocated time -- namely, some classrooms engage students four percent of the time, while others engage students ninety percent of the time.

Student engaged time, or the amount of time students are actively working on an assigned task, is the result of considering both allocated time and engagement rate. In their Follow Through Evaluation Study, Stallings and Kaskowitz (1974) found student engaged time to be the single most important variable of the over 600 studied. Data were collected for three days in 108 first grade classrooms and 58 third grade classrooms. On the average both first and third grade students spent about two hours in reading/language arts and somewhat less than an hour in mathematics (see Table 2). Again, the minimums and maximums provide some insight into

Table 2

Student Engaged Time In Minutes Per Day
For Reading/Language Arts And Mathematics*

	Reading/Language Arts		Mathematics	
	Grade 1	Grade 3	Grade 1	Grade 3
Mean	120	123	44	54
Minimum	34	50	0	7
Maximum	214	201	169	105

*From a reanalysis of Stallings and Kaskowitz - 1974

the variance one might expect in elementary classrooms.

The work on student engaged time needs two qualifying notes. First, the research should not be simply interpreted as saying "more is better." Reanalysis of the first grade math data from Stallings and Kaskowitz, for example, indicates that student achievement increased as student engaged time increased up to about 95 minutes per day, but that additional time related negatively to student gains. Similar results were found for third grade reading/language arts -- approximately 140 minutes of student engaged time appeared to be optimal. With respect to first grade reading/language arts and third grade math, the reanalysis showed student gains continued for the maximum amounts of time observed.

Second, the work on engaged time looks at a classroom as a whole; it does not focus on differences in student needs. Bloom (1976) has estimated that the slowest ten percent of students may need up to five to six times as much time to learn as the quickest ten percent. He argues that if the schools' and their teachers' intent is that all students should master certain basic skills, then the schools and their teachers should plan and implement instruction in ways to insure that allocated time varies in relation to the time students need to learn. Such an approach to school and classroom time is not common practice. As English (1980) has observed, it is much more common to vary the curriculum and standardize the time than to standardize the curriculum and vary the time.

Student Success Experience

The extent students experience success is another variable on which

classrooms significantly differ. Bloom (1976) and Skinner (1968) considered student success rate to be one of the most important of all the instructional process variables. Followers of Skinner's theory, in fact, advocate "errorless learning," suggesting that learning proceeds optimally when no errors are made.

Fisher, Marliave, and Filby's (1979) research indicates that, on the average, students spend only 50 percent of their time on tasks that provide for high success. High success in this case means that the student makes only careless errors, or receives a score of 90 percent or better on written work. Students who spent more than the average time in high success activities generally had better than expected achievement in reading and mathematics. The range in the number of minutes is instructive -- some second grade students had as little as 4 minutes per day at a high success rate in reading, while others had as much as 52 minutes.

Two other categories of success were also studied -- low success, which was defined as the student answering correctly only at a chance level, and medium success, which was simply any score between low and high success. Analysis of the data indicated that the more time students spent at a low success rate the less their final achievement. Marliave and Filby (1980) suggest that two criteria signal inappropriate success rate: (1) more than half a student's time is coded at medium and low success levels; and (2) more than 10 percent of a student's tasks are in the low success category.

A study of 43 second and third grade classrooms (Crawford, King, Brophy, and Evertson, 1975), reflects Fisher's et al. work and, in the process,

challenges, in part, Skinner's theory that "errorless learning" leads to optimal achievement. These investigators found that the optimal level of correct answers to teachers' oral questions was around 75 percent, considerably different from 100 percent. Thus, the appropriate level of success may vary depending upon mode of instruction.

There is also evidence that the appropriate level of success may vary depending upon certain student characteristics. Crawford (1978), using highly structured programmed materials and experimentally varying success rate, found that college students classified as low "need-achievement" and high "fear-of-failure" did best when success rate was approximately 93 percent and worst when success rate was approximately 60 percent. At the same time, high "need-achievement," low "fear-of-failure" students performed optimally with the 60 percent success rate materials and did worst with the 93 percent materials.

Integrative Models of Instruction

None of the four characteristics of effective classrooms which have been identified directly specifies an appropriate method or process of instruction. In this section, we examine several efforts to synthesize research on classroom characteristics and instructional methods. These efforts range from theoretical models, as exemplified by Cooley, Leinhardt and Lohnes, to prescriptive models represented by Rosenshine, Good and Grouws, and Bloom. The examples illustrate alternative ways to conceptualize effective classroom instruction.

Cooley, Leinhardt, and Lohnes' Model of Classroom Processes

In 1963 Carroll proposed a model of student learning that assumes that learning is a function of the student's spending time needed to learn a task. Cooley, Leinhardt, and Lohnes, at the Learning Research and Development Center (LRDC) at Pittsburgh, have revised Carroll's model so that it describes instructional processes (Leinhardt, 1980). The four classroom process constructs are:

- Opportunity: possibility for learning the content tested, includes amount of time provided and content covered
- Motivators: classroom conditions that promote student engagement on tasks
- Structure: the degree to which curriculum is organized and sequenced and the way students are placed in the sequence
- Instructional events: the content, frequency, quality, and duration of interactions among a teacher and students or among students.

In addition, there are two student ability constructs labeled initial student performance and criterion performance. Criterion performance (results on standardized tests at the end of the year) was assumed to be a function of initial student performance (as measured by a test of cognitive abilities) and certain classroom processes incorporated in the four classroom process constructs. Leinhardt (1978) reports that initial student ability alone explains 49 percent of reading achievement and 43 percent of math achievement while the sum of the four classroom constructs contribute much less. Where the four classroom constructs did contribute, opportunity and motivators had the most powerful effects on reading and mathematics achievement gains. Structure seemed to have less importance

for reading than for mathematics. Instructional events, on the other hand, was more important for reading than for mathematics. Generally, it was found that all four processes were related positively to reading and mathematics achievement.

From the perspective of this paper, LRDC's model emphasizes all four characteristics of an effective classroom: attention to content, attention to student characteristics, a concern about time and its use by teachers and students, and a concern that all students experience success.

The "Direction Instruction" Model

In a series of reviews during the 1970s (Rosenshine and Furst, 1973; Rosenshine, 1977, 1979), Rosenshine argued that current research on classroom instruction favors a "direct instruction" model. By direct instruction, he refers to:

> academically focused, teacher-directed classrooms using sequenced and structured materials. It refers to teaching activities where goals are clear to students, time allocated for instruction is sufficient and continuous, coverage of content is extensive, the performance of students is monitored, questions are at a low cognitive level so that students can produce many correct responses, and feedback to students is immediate and academically oriented. In direct instruction the teacher controls instructional goals, chooses materials appropriate for the student's ability, and paces the instructional episode. Interaction is characterized as structured, but not authoritarian. Learning takes place in a convivial academic atmosphere. The goal is to move the students through a sequenced set of materials or tasks. Such materials are common across classrooms and have a relatively strong congruence with the tasks on achievement tests. (Rosenshine, 1979, p. 38)

Good and Grouws (1979) developed a program for fourth grade mathematics instruction based upon this concept of direct instruction.* Their

*It should be noted, that the program developed by Good and Grouws appears to only partially adhere to the direct instruction model. For example, the Good and Grouws' program apparently recommends about 45 minutes of math instruction per day. Considering that students are not actively working

experimental evidence (as compared to the correlational findings cited by Rosenshine) points to the efficacy of the direct instruction model. What makes this evidence especially attractive is that the experimental teachers achieved these results after reading a 45-page training manual and participating in a two-and-one-half hour training program. An overview of the program is shown in Figure 2.

Figure 2. Summary of Key Instructional Behaviors

Daily Review (First eight minutes except Mondays)

- (a) Review the concepts and skills associated with the homework
- (b) Collect and deal with homework assignments
- (c) Ask several mental computation exercises

Development (About 20 minutes)

- (a) Briefly focus on prerequisite skills and concepts
- (b) Focus on meaning and promoting student understanding by using lively explanations, demonstrations, process explanations, illustrations, and so on
- (c) Assess student comprehension
  - (1) Using process/product questions (active interaction)
  - (2) Using controlled practice
- (d) Repeat and elaborate on the meaning portion as necessary

Seatwork (About 15 minutes)

- (a) Provide uninterrupted successful practice
- (b) Momentum—keep the ball rolling—get everyone involved, then sustain involvement
- (c) Alerting—let students know their work will be checked at end of period
- (d) Accountability—check the students' work

Homework Assignment

- (a) Assign on a regular basis at the end of each math class except Fridays
- (b) Should involve about 15 minutes of work to be done at home
- (c) Should include one or two review problems

Special Reviews

- (a) Weekly review/maintenance
  - (1) Conduct during the first 20 minutes each Monday
  - (2) Focus on skills and concepts covered during the previous week
- (b) Monthly review/maintenance
  - (1) Conduct every fourth Monday
  - (2) Focus on skills and concepts covered since the last monthly review

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on math 100 percent of that time, student engaged time may be anywhere from 25 minutes to 40 minutes per day. However, as previously mentioned, a reanalysis of the Stallings and Kaskowitz (1974) Follow Through Evaluation Study data showed that student achievement increased as student engaged time in math increased up to a maximum of 105 minutes per day, more than twice what would result from Good and Grouws' recommendation. Also, Good and Grouws (1979) found it necessary to develop special criterion-referenced assessment instruments, since the content taught by teachers was not sufficiently reflected by the norm-referenced assessment instrument. The direct instruction model specifies that sufficient time be allocated for instruction and that instructional materials be congruent with the achievement test content.

Peterson qualifies the use of the direct instruction model. Her research (1979) concluded that the direct instruction model probably is more appropriate for low ability students or students with an external locus of control. In contrast, high ability students or students with an internal locus of control seemed to benefit from the use of a small-group approach. Peterson also concluded that direct instruction is probably more effective if the outcome objectives are in the basic skills of reading/language arts and mathematics.

From the perspective of this paper, the direct instruction model includes these characteristics:

- Matching instruction to students' ability, though not necessarily their learning styles
- Establishing congruence between classroom tasks and tasks on achievement tests
- Allocating sufficient and continuous time for learning
- Monitoring student performance and ensuring that students produce many correct responses

Mastery Learning

A third approach to organizing the instructional process is mastery learning. Block and Burns (1976) describe two major mastery learning strategies -- one group-based and student-centered (Learning for Mastery, LFM) and the other individually-based and student-centered (Personalized System of Instruction, PSI).

Although the LFM and PSI instructional strategies have evolved from different scientific traditions, affect classroom practice in different

ways and are typically used at different levels of education (Burns, 1979), the two models are similar in that they

- prespecify a set of course objectives that students will be expected to master at some high level
- break the course into a number of smaller learning units so as to teach only a few of the course's objectives at one time
- teach each unit for mastery - all students are first exposed to a unit's material in a standard fashion; they are tested for their mastery of the unit's objectives, and those whose test performance is below mastery are provided with additional instruction
- evaluate each student's mastery over the course as a whole, on the basis of what the student has and has not achieved rather than on how well he has achieved relative to his classmates. (Block & Burns, 1976, p. 12)

Barber (1979) reports on a mastery learning model used successfully in the Denver Public School System (see Figure 3). At the end of a three-year pilot study in five elementary schools, program students showed a significant increase in achievement over non-program students.

Burns (1979) reports on two separate meta-analyses of the research comparing mastery and non-mastery approaches to instruction. His analysis indicated that both group-based and individual-based mastery approaches are more effective than non-mastery approaches, but that in general, the group-based mastery approaches were more effective than the individual-based approaches.

As with the work of Cooley, Leinhardt, and Lohnes and of Rosenshine, the mastery learning model incorporates the four characteristics of effective classrooms cited in this paper. It does this, however, within the framework of a comprehensive model of instruction designed to ensure student success on high priority student outcomes.

Figure 3. Denver Public Schools' Mastery Learning Program Instructional Model

The Mastery Learning strategy being implemented in the Denver Public Schools is an adaptation of the mastery model described by James Block and Lorin Anderson in their book, *Mastery Learning in Classroom Instruction*. Planning and teaching to mastery can best be described through a flow chart.

I. Planning for mastery
- A. State overall objective.
- B. Task analyze overall objective.
  1. Identify prerequisite skills.
     - a. Develop pre-test to measure mastery of prerequisite skills.
  2. Identify component skills.
     - a. Develop summative test to measure mastery of component skills and set mastery standard for that test.
     - b. Write mini-learning unit objectives.
- C. Planning instruction.
  1. Develop lesson plans to teach mini-learning unit.
  2. Develop diagnostic/progress tests to measure mastery of mini-learning unit objectives.
  3. Develop correctives for each mini-learning unit.
  4. Develop extension activities for each mini-learning unit.

II. Teaching to mastery
- A. Orient students to your mastery strategy.
- B. Teach each mini-learning unit to mastery.
  1. Allow students adequate time to practice the skill.
  2. Administer diagnostic/progress tests to determine how students' learning is forming.
     - a. Students who do not master diagnostic/progress tests work with correctives until learning has been mastered.
     - b. Students mastering diagnostic/progress tests "extend" or "broaden" their thinking of that objective by working with extension activities.
- C. After each mini-learning unit has been mastered, administer the summative exam.
  1. Grade the exam based on your predetermined mastery standard.
  2. Report back to students what their grade really represents.
- D. Check on overall effectiveness of program.
  1. Evaluate success of program in terms of students' mastering the final exam.
  2. Compare results of student success in mastery program with student success when you were teaching by traditional methods.

Implications for Action

This paper has highlighted four characteristics of classrooms that can be readily observed and that are strongly related to student achievement -- particularly, in the basic skills. The strength of this relationship is such that we can argue that where classrooms are exemplars of the four

characteristics, there is high possibility that students in those classrooms will be achieving what is expected. In addition, we described several models which give systematic attention to the design and delivery of classroom instruction and which encompass most or all of these characteristics.

In this section, we would like to suggest why these characteristics and models are particularly useful as a focus in supervision, inservice, and other forms of instructional improvement efforts.

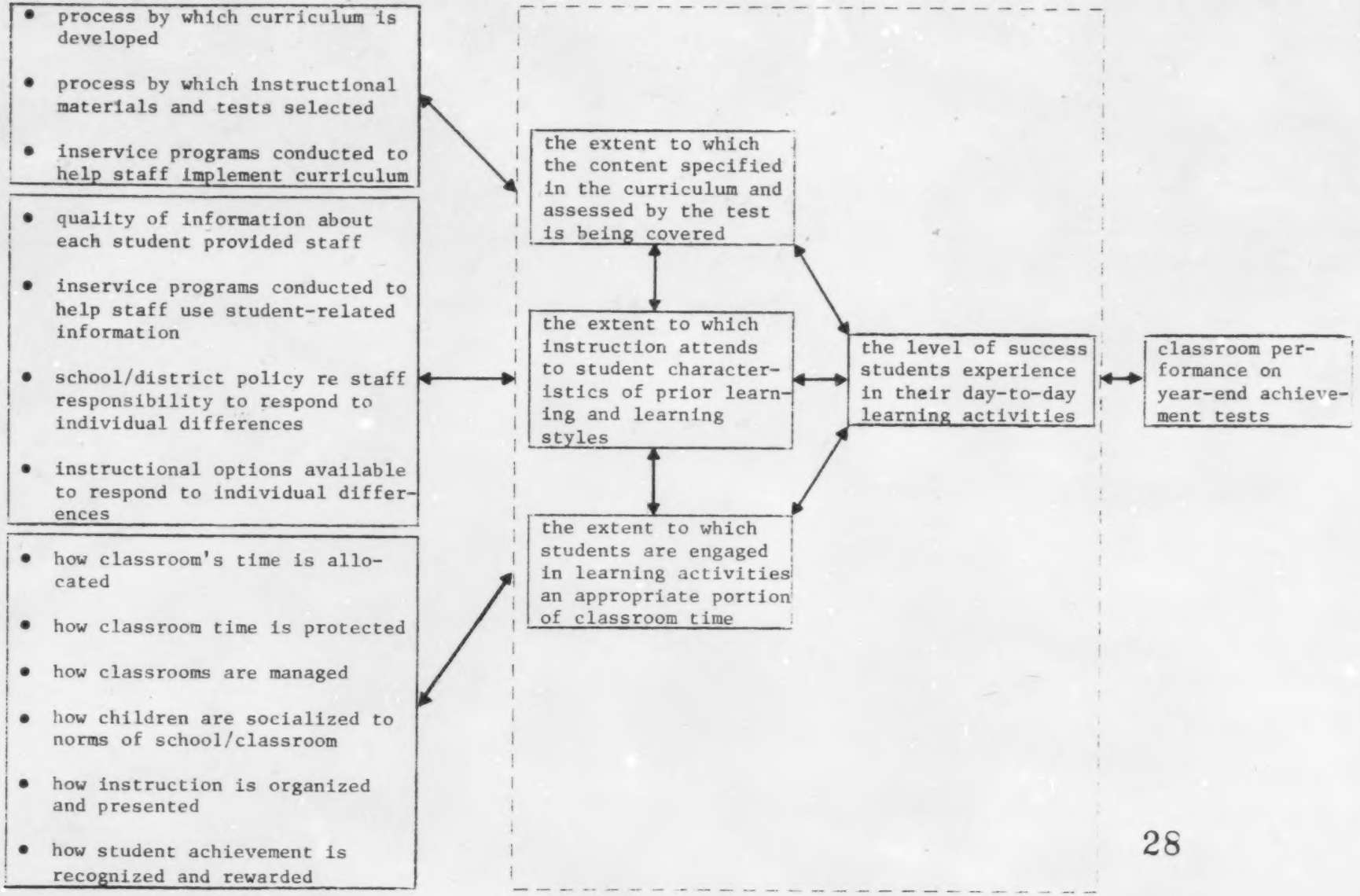
First, as a result of recent research, the characteristics described above have been defined so that they are readily observable. Because of their relationship to student achievement, observations of these characteristics can yield indicators of classroom effectiveness. As such, they can help teachers, principals, and supervisors identify areas of strength and areas for possible improvement. They also can be used to assess "in real time" the effects of classroom improvement efforts.

Second, these characteristics and their relationship to student achievement have a face validity for most educators and lay persons. Obviously, students will be apt to score poorly on achievement tests if they have not been taught the content covered by the tests in a way which enables them to achieve a high level of success on a day-to-day basis. It further follows that students will be more apt to achieve day-to-day success if (1) their lessons start from where they are and (2) the classroom is managed and the instruction is delivered in ways which catch their attention and engage them.

Third, each of these characteristics can be logically linked to other important aspects of the classroom and school (see Figure 4). Thus,

Figure 4

Possible Relationship of Characteristics of Effective Classrooms and Other Aspects of the Classroom and School


• process by which curriculum is developed
• process by which instructional materials and tests selected
• inservice programs conducted to help staff implement curriculum
• quality of information about each student provided staff
• inservice programs conducted to help staff use student-related information
• school/district policy re staff responsibility to respond to individual differences
• instructional options available to respond to individual differences
• how classroom's time is allocated
• how classroom time is protected
• how classrooms are managed
• how children are socialized to norms of school/classroom
• how instruction is organized and presented
• how student achievement is recognized and rewarded
the extent to which the content specified in the curriculum and assessed by the test is being covered
the extent to which instruction attends to student characteristics of prior learning and learning styles
the extent to which students are engaged in learning activities an appropriate portion of classroom time
the level of success students experience in their day-to-day learning activities
classroom performance on year-end achievement tests

information as to the presence of any specific characteristic may be used to stimulate staff inquiry into a whole series of related areas. To be specific:

- If evidence suggests that the content specified in the curriculum and assessed by school and district tests is not being taught, staff could examine:
  - the processes by which the curriculum was developed and the materials and tests were selected
  - the programs conducted to help staff implement the curriculum and use the instructional materials.
- If evidence suggests that the instructional program does not attend to student characteristics, staff could examine:
  - the quality of information about each student provided to the staff
  - the programs conducted to help staff use student-related information
  - the school's and district's policy on individual student differences and on the responsibility of school staff to respond to these differences
  - the instruction options available to respond to individual differences.
- If evidence suggests that student engagement in learning tasks is relatively low, staff could examine:
  - how time is allocated to various instructional objectives
  - how allocated time is protected from unnecessary disruptions
  - how classrooms are managed
  - how children are socialized to the norms of both the school and the classroom
  - how instruction is organized and presented
  - how student achievement is recognized and rewarded.

- If evidence suggests that students are not experiencing a moderate to high level of success, staff may need to re-examine all the areas related to the design and implementation of instruction, including:
  - teacher attention to student characteristics
  - the scope and sequence of learning tasks
  - the modes of instruction used
  - the quality of feedback provided students.

In conclusion, then, we believe recent research has identified four characteristics of effective classrooms. The challenge now is how to design and implement programs which encourage teachers, principals, and supervisors to focus attention on these characteristics.

We are also aware, though, that when attending to these characteristics, attention must also be given to orchestrating and integrating them with the other factors which make up the complex environment called a classroom. Hunter (1979) defines teaching as "the process of making and implementing decisions, before, during, and after instruction, to increase the probability of learning." We propose then that any inservice program concentrate both on teachers' and supervisors' ability in using these characteristics and also on practitioners' ability to make and implement decisions regarding their appropriate use.

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